Moving to Scale: Advancing Equity in STEM in a Change Context

AAC&U: Diversity, Equity, and Inclusive Democracy: The Inconvenient Truths

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www.pomona.edu/administration/institutional-research
• Small, residential, private liberal arts college located 35 miles east of Los Angeles.

• 1671 degree-seeking undergraduates.

• 48 percent students of color; 27 percent URM; 11 percent international; 17 percent first-generation.

• 186 full-time faculty. Student-faculty ratio = 8:1.

• Comprehensive liberal arts curriculum offering 48 majors in arts/humanities, natural sciences, social sciences, and interdisciplinary fields.

• Six-year graduation rate = 93 percent overall, with rates for Black and Latinx typically over 90 percent.
Change looks like this at Pomona...

First Time Full Time Entering Cohort

% of FTFT:

<table>
<thead>
<tr>
<th>Year</th>
<th>Bottom two national family income quintiles</th>
<th>First-generation to college</th>
<th>International</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016</td>
<td>23%</td>
<td>18%</td>
<td>12%</td>
</tr>
<tr>
<td>2015</td>
<td>23%</td>
<td>15%</td>
<td>13%</td>
</tr>
<tr>
<td>2014</td>
<td>20%</td>
<td>15%</td>
<td>11%</td>
</tr>
<tr>
<td>2013</td>
<td>20%</td>
<td>14%</td>
<td>8%</td>
</tr>
<tr>
<td>2012</td>
<td>17%</td>
<td>14%</td>
<td>10%</td>
</tr>
<tr>
<td>2011</td>
<td>18%</td>
<td>17%</td>
<td>7%</td>
</tr>
<tr>
<td>2010</td>
<td>16%</td>
<td>13%</td>
<td>6%</td>
</tr>
<tr>
<td>2009</td>
<td>16%</td>
<td>12%</td>
<td>4%</td>
</tr>
<tr>
<td>2008</td>
<td>15%</td>
<td>11%</td>
<td>6%</td>
</tr>
</tbody>
</table>

Pomona College's new president will be the first woman and African American to lead the campus

President G. Gabrielle Starr
And this......
Diversity as a Tenure Requirement

Pomona changes criteria for evaluating teaching to include whether professors are "attentive to diversity in the student body."

By Scott Jaschik // May 23, 2016

How to Prepare a Diversity Statement

An increasing number of colleges and universities are asking candidates to address their past experiences, current activities and future plans to advance diversity, equity and inclusion.

At Pomona, this statement is one of the four components most critical in our evaluation of candidates. Please feel free to use the following questions to help focus your Diversity Statement.

* What is your experience with diverse students in your classroom?
* How do you incorporate multiculturalism in your teaching materials and methods?
* How has your personal background equipped you to engage diversity among your students?
* How do you address diversity in your own research and teaching?
* How do you interact with individuals from backgrounds that are different from your own? What do you gain from such experiences?
* How do you encourage others who may be under-represented in your field to become involved? Why might this diversity be important?
* How have you previously helped to provide mentorship to a diverse student body?

https://www.pomona.edu/administration/academic-dean/faculty-jobs/how-prepare-diversity-statement

And this......
And also this.
Moving to Scale

Awareness
Patterns of inequity become clear.

Experimentation
Beliefs begin shifting and innovations emerge.

Scaling
Can we replicate success under a variety of conditions?*

*What works, for whom, under what conditions?

Persistent patterns of attrition in STEM

% of students interested in STEM who completed any STEM credit during their first four semesters

Entering cohorts 2002-2009

<table>
<thead>
<tr>
<th></th>
<th>Semester 1</th>
<th>Semester 2</th>
<th>Semester 3</th>
<th>Semester 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asian</td>
<td>97%</td>
<td>94%</td>
<td>86%</td>
<td>83%</td>
</tr>
<tr>
<td>Black</td>
<td>91%</td>
<td>71%</td>
<td>58%</td>
<td>54%</td>
</tr>
<tr>
<td>Latino</td>
<td>92%</td>
<td>81%</td>
<td>64%</td>
<td>72%</td>
</tr>
<tr>
<td>White</td>
<td>93%</td>
<td>85%</td>
<td>75%</td>
<td>72%</td>
</tr>
<tr>
<td>International</td>
<td>91%</td>
<td>94%</td>
<td>86%</td>
<td>83%</td>
</tr>
</tbody>
</table>
Introduction to Genetics, taught by Professor Lenny Seligman
Introduction to Genetics is the first Biology course students encounter at Pomona and serves as a gateway to the life sciences. To address persistent gaps in performance, one section of the course was redesigned to include:

- Small size (from 17-24 students), with cohort students pre-enrolled.
- Mandatory attendance at weekly, mentor-led problem sessions.
- Interactive lecture and group learning.
- Direct, careful engagement of stereotype risks to avoid stigmatization (“first day script”).
Strengthening Co-Curricular Support

**Academic Cohort Programs**

- Faculty-led
- Weekly group meetings
- Individual advising
- Focus on how to “do college”
- Examples:
  - POSSE Chicago
  - POSSE STEM Miami
  - High Achievement Program (HAP)
  - Pomona Science Scholars (PSS)
  - Pomona Scholars of Math (PSM)

**Peer Academic Coaches**

**Quantitative Skills Center (QSC)**

QSC staff members:
Nita Kansara, Dylan Worcester, and Travis Brown
The Big “A-HA:”
We CAN overcome equity gaps in STEM.

Percent of students earning a grade of “C” or lower in Intro Biology:
“Traditional” sections vs. redesigned “small sections.”
The Big “A-HA:”
Seeing (the data) is believing.

Common exam questions across traditional and redesigned sections made it possible to verify that the reduction in performance gaps was “real” (i.e., not an artifact of grade inflation).
Strengthening Quantitative Pathways to STEM Success at Pomona

- Cultivating *faculty awareness and agency* around equity issues in STEM.
- Integrating high-impact, *cohort-based practices* into teaching and advising.
- Strengthening the foundation for quantitative skill development in multi-section *introductory courses*.
- Designing *analytical tools and resources* to develop, sustain and scale promising practices.
Equity & Success in STEM at Pomona: A Working Theory of Change

GOALS/OUTCOMES

“Cohort Students” = First-gen, Black and Latino/a students in Pomona College science cohorts (PSS, PSM, and POSSE-STEM).

1. 80 percent of cohort students complete intro STEM courses with a grade of B or higher.
2. Cohort students demonstrate proficiency in quantitative reasoning at equivalent or higher levels than other groups by the end of 2nd year.
3. Cohort students demonstrate mastery of core intro STEM concepts at equivalent or higher levels than other groups by end of 2nd year.
4. Between-group variance in the persistence to a STEM- or math-based major is no more than 5 percent.

Outcome Measures:
1. Percent of students with at least a 3.0 in core intro courses.
2. Percent of students who demonstrate mastery of Quantitative Reasoning in select intro STEM courses.
3. Percent of students interested in STEM who persist to a STEM-related major.

PRIMARY DRIVERS

Student Mindsets and Skills: Cohort students develop productive mindsets and skills for persistence and success in STEM at Pomona College.

Intermediate Measures:
- Self-efficacy/STEM agency
- Commitment to STEM
- Resilience to stress/anxiety
- Awareness/use of campus resources
- Development of help-seeking and time-management behaviors.

Faculty Mindsets: Faculty approach course design, teaching and planning for student success with an equity mindset.

Intermediate Measures:
- Faculty regularly engage in data-rich routines that cultivate equity mindsets and analysis of student performance.

Inclusive Pedagogy: Faculty and advisors integrate high-impact, student-centered, responsive pedagogies into core STEM courses and advising routines.

Intermediate Measures:
- Student perceptions of classroom climate
- Student perceptions of the relevance of courses to their lives
- Faculty self-efficacy

Supportive Networks: Cohort students are socially and academically connected to faculty, staff, peers and courses

Intermediate Measures:
- Students perceive that faculty care about their success
- Students participate in peer study groups
- Students develop a sense of community/belonging in STEM courses and among STEM peers

STRATEGIES

Messaging/communication with students reflects the notion that STEM is rigorous AND doable.

Cohort students attend weekly mentor sessions focused on “doing college.”

Cohort students deepen their interaction with advisors and craft meaningful academic and professional goals.

Cohort students participate in at least one summer research project with Pomona faculty.

Faculty engage in targeted professional development to support students from underrepresented backgrounds.

Planning and data routines are embedded into institutional work-flows.

Appropriate incentives are aligned with faculty participation in professional development, cohort support and assessment activities.
Data-Rich Routines and Rituals
## Responsive Data Aligned with Change Context

<table>
<thead>
<tr>
<th>Primary purpose of the data:</th>
<th>Examples:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Raise awareness about trends and patterns</td>
<td>Disaggregated data on:</td>
</tr>
<tr>
<td></td>
<td>- Course enrollments</td>
</tr>
<tr>
<td></td>
<td>- Course completions</td>
</tr>
<tr>
<td></td>
<td>- Major completions</td>
</tr>
<tr>
<td>Cultivate faculty buy-in/agency</td>
<td>- Ad-hoc studies driven by faculty inquiry</td>
</tr>
<tr>
<td></td>
<td>- Coordinated assessments of targeted initiatives</td>
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<tr>
<td></td>
<td>- Displays of data that invite faculty engagement</td>
</tr>
<tr>
<td>Scaling</td>
<td>- “Practical measures” to facilitate implementation</td>
</tr>
</tbody>
</table>
Cohort-based initiatives show promise.

STEM Persistence Through 4th Semester

- Latino - no STEM cohort
- Latino - STEM cohort

Entering Cohorts:
- 2008-2012
- 2013-2014
Cohort-based initiatives show promise.

STEM Persistence Through 4th Semester

- Black - no STEM cohort
- Black - STEM cohort

Entering Cohorts:

- 2008-2012
- 2013-2014
Work-In-Progress:
Moving Equity from the Margins to the Center

• Building faculty capacity for inclusive teaching and mentoring.

• Sustaining / expanding a high-touch, resource-intensive model of cohort support.

• Identifying and adapting specific pedagogical/curricular/co-curricular components that can work in a variety of contexts.
Bringing improvements to scale begins with an equity-minded, data-rich, networked campus design.

- Cross-functional campus networks.
- Equity-minded* working theory of change.
- Data-rich routines and rituals.
- Responsive data aligned with the change context.

*Center for Urban Education: https://cue.usc.edu/equity/equity-mindedness/
Student success is a team effort!

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Director, Quantitative Skills Center 
and Academic Cohorts

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Mary Coffey  
Associate Dean of the College;  
Associate Professor of Romance Languages and Literatures

Lenny Seligman  
Professor of Biology

Hector Sambolin, Jr.  
Associate Dean for Academic Affairs,  
Academic Success and Assessment